PRODUCT DATA

PULSE™ Lite Noise and Vibration Analysis — Type 3560 C-L

PULSE™ Lite is a simpler alternative to PULSE, Brüel & Kjær's real-time multi-analyzer, from which it is derived.

While maintaining many of the features that have made the PULSE platform the success it is, PULSE Lite's strength is its simplicity. It is geared towards users who are new to the field of sound and vibration measurement, those who do not require a complex analysis package, and/or those under budgetary constraints.

PULSE Lite offers a genuine ease of use through its few, simple applications. This allows even a complete novice to troubleshoot confidently in the sound and vibration field just a short period after familiarising themselves with the system. Furthermore, PULSE Lite users have access to the natural growth path offered by being a member of the PULSE family. That is, if your measurement needs change after purchasing PULSE Lite, your equipment does not become obsolete – it forms the basis for an easy upgrade to a more powerful PULSE solution. In the event of such an upgrade, your hardware remains the same, you simply need a new license key.

3560C – L

Brüel & Kjær

USES
- Basic acoustic analyzer
- Basic vibration analyzer
- Simple vibration analysis (FFT) (machinery vibration)
- Impact testing (FFT) (resonance analysis)
- CPB analysis (1/1 Octave, 1/3 Octave)
- Product noise evaluation (FFT or CPB)
- Run-up/Run-down analysis (FFT)
- Transient analysis (FFT or CPB) (analysis of non-stationary signals)

FEATURES
- Genuine ease of use with scenario-orientated user-interface
- Intelligent analysis-setup defaults that suit most applications
- Compact functionality
- Simple and efficient data management
- Remote system control via Wireless LAN interface for hard-to-access/dangerous environments – 100 m possible without use of external antennae
- Easy integration with MS® Excel for post-processing of data
- Growth potential – compatibility with PULSE family enables easy upgrade to greater functionality

Introduction

Since the successful introduction of PULSE to the sound and vibration analysis market in 1996, Brüel & Kjær has strengthened its position by continuously developing new features and applications for it. Today, PULSE is a flexible and versatile analyzer platform with a comprehensive range of applications whose popularity as a sound and vibration solution is widespread.

As a member of the PULSE family, PULSE Lite's design is forged from Brüel & Kjær's years of experience in the sound and vibration measurement field. Brüel & Kjær's knowledge base is a solid platform from which high-quality hardware with a long lifetime is produced with the goal of making sound and vibration measurements easier.

However, the full-scale PULSE approach is not always necessary for the demands of simpler measurements where more straightforward, standard applications and less functionality are required. Similarly, not all personnel performing sound and vibration analysis have wide-ranging experience in that field. Having identified this situation, Brüel & Kjær has produced a solution – PULSE Lite.

Ease of Use

PULSE Lite is characterised by a genuine ease of use. Nor is this just an idle boast – it has many features to back up this claim including:

- a Microsoft® Outlook® look and feel
- task-driven measurement steps
- just a few setup parameters to complete before being able to measure – all measurements are set up with default values which will cover most needs and are simple to change

- all displays predefined for fast analysis/viewing of data
- one-click export directly to Microsoft® Excel or ASCII text file
- one-click import of data for 'A to B' comparisons

PULSE Hardware

The quality of PULSE hardware is a Brüel & Kjær hallmark offering you:

- built-in signal conditioning
- signal conditioning for ICP accelerometers and microphones
- full TEDS support
- choice of power supply: battery, AC, DC
- hot-swappable batteries
- lightweight, rugged build
- remote LAN control
- Brüel & Kjær quality

Remember that when upgrading from PULSE Lite to a full PULSE system, your existing hardware doesn't become obsolete – you keep it and use it in the new system!

PULSE Lite Configurations

PULSE Lite comes in three configurations:

- Type 3560 C-L1 PULSE Lite, Basic 2-channel FFT Analyzer-based system (including PC)
- Type 3560 C-L3 PULSE Lite, Basic 4-channel FFT Analyzer-based system (including PC)
- Type 3560 C-L5 PULSE Lite, Basic 2-channel CPB Analyzer-based system (including PC)

Types 3560 C-L1/3 are available as basic vibration analyzers and Type 3560 C-L5 as a basic acoustic analyzer. The three configurations are based upon the existing PULSE front-end, Type 3560 C, but have reduced functionality and expandibility in accordance with their position as basic analyzers.

The Run-up/Run-down options Type 7783-N2 (1 – 2-channel) and Type 7783-N4 (3 – 4-channel) are also invaluable for the measurement of non-stationary signals.

Basic FFT Analysis, Impact Testing and Run-up/Run-down

The FFT product includes two templates: Basic FFT Analysis for general vibration measurements and Impact Testing for structural measurements.

The Basic FFT Analysis template offers:

- 1 Hz – 25.6 kHz in 125 and 2^n steps
- 50 – 6400 lines resolution
- 50-point waterfall plot (updated via time)
- Time, spectra, FRF, etc.

The Impact Testing template offers:

- same frequency range and resolution as basic FFT analysis
- hammer-based impact analysis
- save up to 50 data points for export
- FRF, coherence, imaginary part and phase all available

The Run-up/Run-down option includes:

- same frequency range and resolution as basic FFT analysis
- FFT-based order analysis
- up to four user-selectable orders plus overall versus RPM with 'Spectral Viewer' capability
- Run-up/Run-down waterfall analysis updated via average speed

Basic CPB Analysis

What is 'Spectral Viewer'?
Spectral Viewer is what we call PULSE Lite's display functionality. The display provides you with simultaneous viewing of both overall and individual level spectra with a simple movement of the cursor

The CPB product includes:

- true digital 1/1 (125 mHz – 16 kHz) and 1/3 (100 mHz – 20 kHz) octaves as per ISO and ANSI standards
- overall A and L bands measured simultaneously
- overall vs. time with 'Spectral Viewer'
- basic loudness measurements based on the ISO 532 B standard
- 50-point waterfall plot for transient analysis
- fast or slow time-weighting
- linear or exponential averaging
- minimum or maximum hold on the individual band

PULSE Lite Software

PULSE Lite gives you the freedom to make measurements in the field or laboratory and to process your data wherever you want. Your PC can also connect to your front-end via a standard LAN or even a wireless LAN allowing you to operate in unsafe and/or uncomfortable environments.

Automatic Transducer Detection

PULSE Lite's template stores information when a transducer is added to a channel. This information is automatically retrieved if an IEEE P1451.4 capable transducer with stand-ardised TEDS is connected to the front-end. All (TEDS) transducer information, like data type, serial number, nominal sensitivity, calibration, microphone capacitance, etc., are automatically stored and saved with a PULSE Lite project.

User-interface
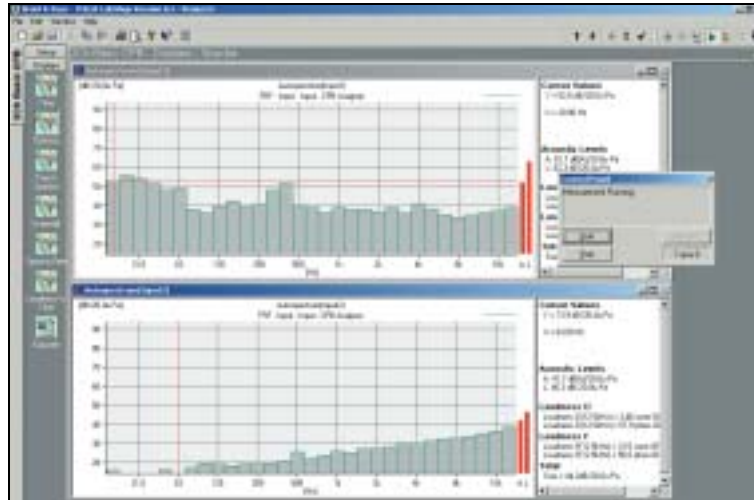
PULSE Lite is designed to facilitate the measurement procedure. A task-orientated user-interface with status indicators informs you of measurement progress while measurement-validation features ensure you secure correct data the first time around. PULSE Lite uses the same multi-buffers, slices and triggers that come with full PULSE systems, though with the added benefit that all values are predefined, thus greatly simplifying the user-interface, data processing and the entire measurement process.

PULSE Lite's task-oriented user-interface consists of a simplified menu bar with standard functionality running along the top of the screen and a task bar down the left-hand side of the screen. The task bar contains most of the application's functionality in the form of stacked menus, similar to that of Microsoft® Outlook®. These menus are called task groups and they help guide you through the measurement process. PULSE Lite has two such groups – *Setup* and *Display*. Both task groups contain a series of tasks activated from icons in the task bar.

The Setup menu comprises icons relating to different measurement steps (see Fig. 2). Clicking on each Setup icon automatically brings up a detailed note to guide you through the relevant measurement stage. For Run Up/Run Down measurements, an extra *Tacho Monitor* icon appears in the Setup task group which enables you to monitor the tacho signal and the RPM.

PULSE Lite also has context-sensitive, on-line Help which can be accessed by pressing **<F1>**.

The Display menu comprises a set number of icons (depending on the template in use), each relating to a different way of displaying your data. Depending on the template in use, Time, Waterfall and Contour displays are amongst those available. There is also the Exporter icon , as previously seen in the Setup task group.

The actual display templates are predefined but you can use an **Overlay Curve** command to compare and contrast the current curve with historical data from another curve of the same type. A zoom/unzoom function is also available to compare and contrast measurement data further.
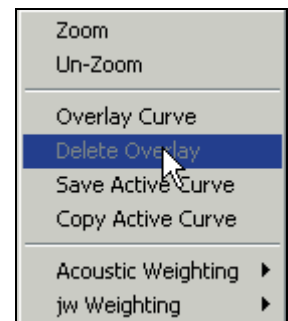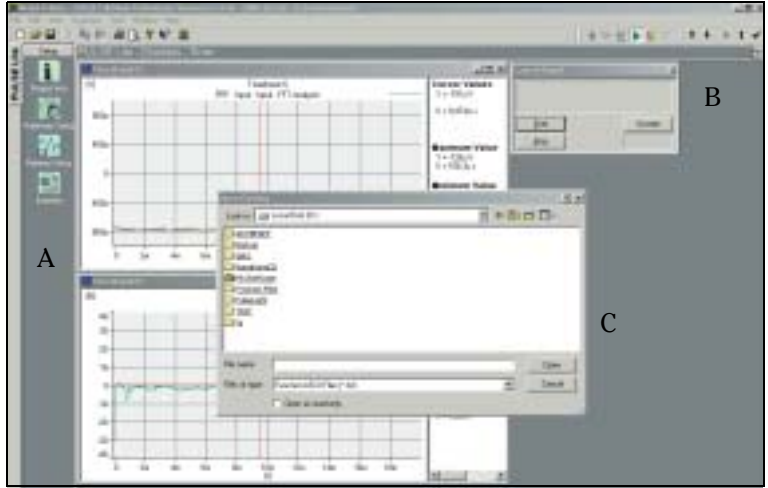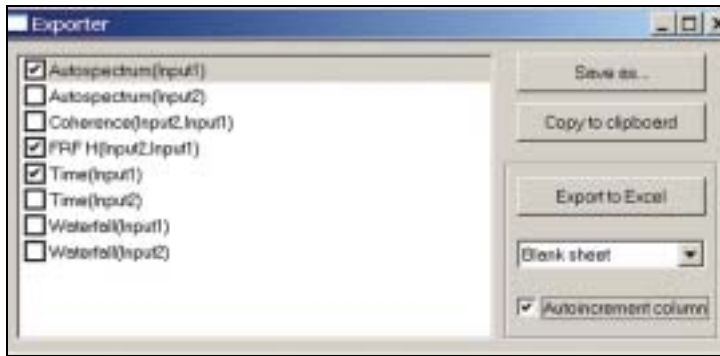
Data Export

Fig. 5
The Exporter window

PULSE Lite saves data in PULSE ASCII format or Universal File Format (UFF) for export to other processing applications. You simply select the required functions. Alternatively, you can directly export your data to Microsoft® Excel, either to new or existing spreadsheets.

By ticking the **Autoincrement column** check box (see Fig. 5), the selected functions have their data exported to the first sheet in the selected Excel workbook in column sets.

Future Possibilities

Purchasing PULSE Lite as a measurement solution does not put you in a dead-end. Backed up by Brüel & Kjær's wealth of experience gained over decades, it is just a single product in a comprehensive range of sound and vibration measurement solutions tailored to all budgets, skill levels and requirements – the PULSE family. That is to say, if you invest in a PULSE Lite solution but later find that you need more measurement capability, PULSE Lite is your link to the PULSE family and an easy upgrade path.

PULSE Lite can be upgraded to a full PULSE license at any time meaning you can:

- perform multi-analysis
- design your own PULSE projects
- upgrade to 128 channels

Full access to the PULSE family offers many more measurement possibilities including: remote control of PULSE via ActiveX® control; streaming of raw time data to hard disk; sound quality analysis; modal analysis and the measurement of sound power to all standards (sound pressure and sound intensity).

All this and more can be achieved with your existing hardware – you just need a new software license. For more information on upgrading, see the Brüel & Kjær System Data sheets concerning PULSE Types 3560 C/D/E. The relevant Brüel & Kjær literature numbers are:

- BU 0228 (Hardware)
- BU 0229 (Software)

Specifications PULSE™ Lite Type 3560C – L

PULSE Lite offers seven templates:
• Basic FFT (2- and 4-channel)
• Basic CPB (2-channel)
• Impact Testing (2- and 4-channel)
• Run-up/Run-down (2- and 4-channel)

Basic FFT

FREQUENCY
Lines: 50 – 6400
Span: 1 Hz – 25.6 kHz in 125 and 2^n steps
Overlap: 0%, 25%, 50%, 66.67%, 75% and Max%

AVERAGING
Mode: Exponential, Linear and Peak
Averages: user-definable

Time Weighting: Hanning Window

Signal Trigger: none

WATERFALL PLOT
No. of Traces: 50
Increment: user-definable in seconds

Basic CPB

FREQUENCY
Span: 100 mHz – 25.6 kHz

Bandwidth: 1/1 Octave and 1/3 Octave
Weighting: Linear and A-weighting

AVERAGING MODE
Linear: Averaging time user-definable in seconds
Exponential Time Weighting: 1 s (slow) and 1/8 s (fast)
Hold: None, Maximum Hold and Minimum Hold on the individual bands

WATERFALL PLOT
No. of Traces: 50
Increment: user-definable in seconds

Impact Testing

FREQUENCY
Lines: 50 – 6400

Span: 1 Hz – 25.6 kHz in 125 and 2^n steps

AVERAGING
Mode: Exponential, Linear and Peak
Averages: user-definable

Time Weighting: Uniform Window

Signal Trigger: Input1 Signal
Trigger Level: user-definable in % of max. input
Delay: user-definable in seconds

WATERFALL PLOT
No. of Traces: maximum 50
Increment: by validation of the measurement using 'Accept' button

Run-up/Run-down Testing

Lines: 50 – 6400
Span: 1 Hz – 25.6 kHz in 125 and 2^n steps
Overlap: 0%, 25%, 50%, 66.67%, 75% and Max%

AVERAGING
Mode: Exponential only
Averages: user-definable

Time Weighting: Hanning Window

TRIGGER
Start: user-definable in RPM
Stop: user-definable in RPM
Update: user-definable in RPM

TACHO
Pulses/Rev.: user-definable
Order Traces: Up to four user-definable orders

Data Validation and Display Plots

- Level Meter
- RPM Meter
- Time wave form
- Autospectra
- FRF magnitude and phase
- Coherence
- Bode plots
- Waterfall plots
- Contour plots

Cursor and Cursor Fields

- Main
- Harmonic
- Time, Frequency or Order
- Acoustic level
- Corrected frequency
- Resonance
- Minimum value
- Maximum value
- Total
- Speed

Display Functionality

Each display can be manipulated via mouse-menu commands:

- Zoom
- Unzoom
- Overlay Curve
- Delete Overlay
- Save Active Curve
- Copy Active Curve
- Spectral Units – Power (mean square), Root Mean Square, Power Spectral Density, RMS Spectral, Energy Spectral Density
- Acoustic Weighting – As signal, A-weighted, B-weighted, C-weighted, D-weighted, Linear
- $j\omega$-Weighting – $1/j\omega^2$, $1/j\omega$, None, $j\omega$, $j\omega^2$

Data Export

Export of selectable functions in PULSE ASCII File or Universal File Format (UFF)
Direct export of selectable functions to Microsoft® Excel

Ordering Information – PULSE Lite

3560 C-L1	PULSE Lite Basic 2-channel FFT Analyzer including Laptop PC UL 0220[1]
including:	
Type 7781–N2	Basic FFT 1 – 2-channel License
M1–7781–N2	Software Maintenance and Support Agreement
3560 C-L3	PULSE Lite Basic 4-channel FFT Analyzer including Laptop PC UL 0220[1]
including:	
Type 7781–N4	Basic FFT 3 – 4-channel License
M1–7781–N4	Software Maintenance and Support Agreement
3560 C-L5	PULSE Lite Basic 2-channel CPB Analyzer including Laptop PC UL 0220[1]
including:	
Type 7782–N2	Basic CPB 1 – 2-channel License
M1–7782–N2	Software Maintenance and Support Agreement

All the above PULSE Lite systems include the following:

Type 2827	Portable Data Acquisition Unit
Type 7533	LAN Interface Module
Type 3032 A	6/1-channel Input/Output Module
UL 0220-xx[2]	Dell® Latitude® Budget Notebook PC

Optional Accessories

Type 7783-N2	PULSE Lite 1 – 2-channel Run-up/Run-down Analysis Option

Type 7783-N4	PULSE Lite 3 – 4-channel Run-up/Run-down Analysis Option
WIRELESS LAN	
UL 0196	Access Point with 1 Wireless LAN PCMCIA Card
UL 0197	Car Antenna, maximum speed 140 km/hr (87.5 mph)
UL 0198	Range Extender Antenna for Indoor Use
UL 0199	PCMCIA Card for Notebook PC
AQ 0642	Power Cable between UL 0196 and Type 3560 C

Options to PULSE Lite Systems

3560 C-L2	Basic 2-channel FFT Analyzer *without* Laptop PC UL 0220 (similar to 3560 C-L1)
3560 C-L4	Basic 4-channel FFT Analyzer *without* Laptop PC UL 0220 (similar to 3560 C-L3)
3560 C-L6	Basic 2-channel CPB Analyzer *without* Laptop PC UL 0220 (similar to 3560 C-L5)

Software Upgrades to Full PULSE Systems

UA 1628	Upgrade from PULSE Lite 4-channel to PULSE 7700-N4
UA 1629	Upgrade from PULSE Lite 2-channel to PULSE 7700-N2

1. Laptop does not include Microsoft® Office
2. 'xx' specifies country: GB, DE, FR, ES, IT or SE

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